

USE OF ADMINISTRATIVE DATA IN MEASURING QUALITY OF CARE

Prepared for: The Rhode Island Department of Health (HEALTH)



**100 Roscommon Drive
Middletown, CT 06457**

August 2000

Project Team Members

Jeanne D. Scinto, PhD, MPH

Director of Analysis and Medicare Quality Improvement, Qualidigm

Tierney E. Sherwin, MPA

Project Coordinator, Qualidigm

Jennifer Fowler, BS

Administrative Assistant, Qualidigm

Introduction

The purpose of this report is to provide a framework for discussion regarding how the Hospital Discharge Database (HDD) in Rhode Island (RI) may be augmented for reporting hospital based performance measures in compliance with the Rhode Island Health Quality Performance Measurement and Reporting Program (HQPMR). The paper will present the advantages and disadvantages of reporting health care quality measures that rely solely on administrative data. The summary will be followed by an overview of two central methods for enhancing administrative data, along with specific examples. A description of some national and state efforts to use standardized administrative data will be discussed along with pertinent measurement systems. Finally, a list of suggestions will be provided as potential next steps for the Hospital Discharge Data in light of HQPMR.

Background

Clinical (Abstracted) Data

Clinical data for the purposes of these discussions is simply data abstracted from medical records. The range of data elements in such a category are extensive, from administrative information (e.g., medical record number) to detailed clinical information (e.g., dose of medication). Often outcomes of care have been assessed through the use of clinical (abstracted) data. For example, results from the Health Care Financing Administration's (HCFA) Cooperative Cardiovascular Project show that developing quality indicators based on clinical practice guidelines, length of stay and mortality, produce meaningful data that tracks improvements over time (Marciniak, 1998). Though this method can provide an accurate and detailed account of the care delivered to a sample of patients, individual record abstraction is time consuming and expensive. Abstraction time per medical record, once the tool is developed and the record is located, can range from minutes to hours depending on tool length and the experience of the abstractors. Additionally, the accuracy and reliability of abstracted information is only as good as the individual documenting that information. Intensive training of abstractors and rigorous testing of the tools are essential to ensure that reliable and valid results are obtained while minimizing the introduction of information biases.

Administrative Data

For the purposes of discussion, administrative data is defined as: "large, computerized data files generally compiled in billing for healthcare services such as hospitalizations." (Iezzoni, 1997) The use of administrative data for health care quality reporting involves balancing trade-offs between a number of advantages and disadvantages. In contrast to clinical data, administrative data (or claims or billing data) is often uniform, available electronically, less expensive to obtain, and available for a larger number of patients (often a population). The use of secondary data is an acceptable and encouraged practice among health researchers when given careful methodological consideration. This type of data is informative about major processes of care. However, it is primarily collected for payment purposes, and therefore may be considered suspect. This is evident in the inherent potential for upcoding in claims submissions for the purpose of

maximizing reimbursement. Further, administrative data provides only limited clinical information. For instance, accurately capturing data on the rate of surgical site infections is nearly impossible without some medical record abstraction. Without rigorous validation of antibiotic dispensing data with the medical record to confirm that medications were prescribed for surgical site infections rather than as part of routine post-operative prescribing practices, it is not possible to calculate a surgical site infection rate. Therefore, though infection rates may be of interest to consumers, they are difficult to report from administrative data sources.

Research based on administrative data requires a rigorous assessment of their quality. This is particularly true given that administrative data were not originally collected for the purpose of health research, so considerable effort must be placed on data validation. Quality reviews are commonly performed through audits of selected data elements documented in the medical record, as compared to elements contained in the claims data. Beginning in 1991, researchers found that the concordance rate between medical records and claims data can be quite high. For example, Whittle, Steinberg, Anderson et al. found “that the estimates of cancer incidence rates based on Medicare claims data were within six percent of estimates using the National Cancer Institute Surveillance, Epidemiology and End Results (SEER) data” (AHCPR, Hospital Inpatient Statistics: 1996, July 1999). However, such results vary depending on the data systems and quality edits applied. In another AHRQ, formerly AHCPR, funded study, Iezzoni et al. found that the agreement rate between medical record and billing information ranged from 98% to 67% (Iezzoni et al., 1999). Further, such quality checks do little to inform the rate of underreporting. As has been noted by AHRQ, socially stigmatized conditions such as drug abuse are underreported, as are minor procedures and medical errors (AHCPR, Hospital Inpatient Statistics: 1996, July 1999). Administrative data, when augmented with data abstracted from medical records, captures such underreported conditions, to the extent that they are documented in medical records.

Distinguishing between conditions present on admission and those that occur during the course of a hospitalization is another area needed for data quality assessment. As pointed out by Pine and others, administrative data lacks pathophysiological data and the ability to distinguish between comorbidities and complications (Pine, 1999). As shown in their study of the use of Medicare claims data for reporting on outcomes of care, Mitchell et al. note that “...claims do not distinguish reliably between those diagnoses presented at admission and those that arise during hospitalization” (Mitchell, et al., 1994). Further, the authors note that in some instances a surgeon may not charge a patient for treatment of complications, thus no billing record is generated.

Finally, the receipt of administrative data often remains timelier in comparison to primary collected data. But lag times due to claims processing often render the data out-of-date by the time such retrospective data are complete. In terms of HQPMR, a significant disadvantage of administrative data is the lack of information needed for complete risk adjustment. For example, HDD currently lacks a 6th digit ICD-9 code, complete data on race/ethnicity, family history and historical medical data on the patient, and clinical data such as blood pressure, heart rate or body temperature, which are useful elements in creating a risk adjustment index.

Objective: Enhance Administrative Data

There are two strategies to enhancing HDD that should be considered. First, as demonstrated in Connecticut with the Office of Health Care Access' Report Card project, it is imperative that hospital based performance measures used in public reports are risk adjusted if they are to be considered useful to the hospital community. Second, in order to augment information available for public reporting, it would be helpful to link HDD with pharmacy and laboratory data. Therefore, each of these two objectives will be described in detail, with national and state specific examples to support the recommended strategies.

Risk Adjustment

In order to provide meaningful comparisons of performance measures, risk adjustment is required. Risk adjustment methods depend largely on the outcome of interest being measured. This includes whether the measure is condition-specific or generic, and whether the processes of care or outcomes of care are of interest. For example, numerous severity adjustment systems or severity-adjusted measures exist that allow for “apples to apples” comparisons of in-hospital mortality (i.e. APACHE, APR-DRGs). Conversely, disease specific models have been developed that are unique to the condition of interest. Risk adjustment methods range from simple stratification techniques such as stratifying a performance measure by age and gender and restricting analyses to certain subgroups, to complex modeling techniques. Methods with particular relevance to HQPMR are detailed below.

Examples of Methods of Enhancing Hospital Discharge Data

Risk Adjustment Methodology – Example: ICD-9 6th digit-Timing of Diagnosis Indicator

One potential method for improving the utility of administrative claims data to assess the quality of health care is the addition of a data element on the timing of each diagnosis. Some states, New York, since 1993, and California, since 1996, have required hospitals to report the timing of each diagnosis with the patient's discharge abstract data submitted to the state. Diagnoses reported on the discharge record include a flag indicating whether the condition was present on admission or not. This additional information is useful when developing risk adjustment models for hospitalized patients in that conditions present on admission (comorbidities) can be distinguished from conditions that develop during the hospital stay (complications) and are therefore potentially reflective of a service of care quality problem.

In a 1991 study by Naessens et al., it was argued that collecting data to distinguish between complications and comorbidities was feasible and was found to be informative for providers (Naessens, 1991). Their findings, from a study in Minnesota's Mayo-affiliated hospitals, indicate that for little added cost and at less than two additional minutes per hospital discharge abstract, reliably differentiating between conditions present on admission and those that develop during the stay is possible for a select set of secondary diagnosis codes.

There are three states (NY, MA and CA) that use a unique patient identifier (social security number) to track individual patients throughout the healthcare system. This permits capturing a

comprehensive set of information on any single patient, which may be used in risk adjustment. This is an endeavor RI might consider evaluating in terms of feasibility and utility, while considering any Health Insurance Portability and Accountability Act (HIPAA) considerations that may apply.

Risk Adjustment Methodology – Example: HCIA

Several vendors have commercial severity adjustment systems for use with hospital inpatient data that address comorbidities and complications. HCIA is one such vendor that has developed a method for normative comparisons for their risk adjusted complications index and their risk adjusted mortality index (HCIA, 2000). This method uses patient-level data to control for case-mix and severity differences by evaluating ICD-9-CM diagnoses and procedure codes to adjust for severity within case mix groupings. Patients are compared to other patients with similar characteristics, and facilities are compared to other facilities with similar characteristics. Hospitals are grouped according to the American Hospital Association Guide categories. Using the HCIA method, complication rates for two patient risk groups may be generated: surgery and medical. DRG-specific and ICD-9-CM-specific mortality rates may be created as well. Rhode Island's Hospital Association (HARI) has not used either of HCIA's systems for risk adjustment.

Combining Lab and Pharmacy Data with HDD – Example: Enhancement of Data with Laboratory Values

Pine et al., have compared risk-adjusted mortality predictions using administrative data alone, administrative data plus laboratory values, and the combination of administrative, laboratory, and clinical data. The findings suggest that adding laboratory data to administrative data can provide accurate predictions of inpatient death from Acute Myocardial Infarction (AMI), cerebrovascular events, congestive heart failure, and pneumonia. Pine and colleagues acknowledge three important methodologic limitations as part of their research. First, the laboratory data was obtained from medical record abstraction and not electronic sources; the results are applicable only to the conditions studied; and the results need to be validated in hospitals other than those in the midwest (Pine et al, 1997).

Pine et al., have also evaluated the utility of augmenting discharge abstract data that includes the 6th digit ICD-9 code for each secondary diagnosis. Patients studied as a part of this research include those discharged with AMI, congestive heart failure and pneumonia from 22 acute care hospitals in St. Louis, Missouri. As with administrative data, not augmented with 6th digit ICD-9, predictions of inpatient mortality improved when laboratory data were combined with administrative data that distinguished comorbidities from complications. The addition of clinical data contributed little more to the ability to predict inpatient mortality. The value of this methodology in relation to other outcomes, such as readmission rates or mortality post discharge, has not been evaluated.

National Efforts

HIPAA

The Health Insurance Portability and Accountability Act of 1996, was passed to assure that workers and families who change or lose their jobs will be protected from losing their health insurance coverage. The Administrative Simplification Act, one component of this legislation, seeks to reduce administrative costs in the health care industry. This Act calls on the Department of Health and Human Services (DHHS) to develop national uniform standards for the electronic transmission of certain health information. Such standards are to be adopted by all health plans, payers and organizations that process health data electronically.

Health and Human Services (HHS) is collaborating with a variety of public and private bodies to develop these standards. For example, the National Association of Health Data Organizations (NAHDO), the National Center for Health Statistics of the Center for Disease Control (CDC) and the American National Standards Institute (ANSI) are some of the organizations working together on setting national standards. Although the standards pertain to a number of different types of health information, the two areas of particular importance to HQPMR are: health insurance claims and equivalent information for encounters in managed care settings as well as health data codes and classification systems. The advocates of this process note the following potential outcomes from the standards development and implementation process: streamlined operations, reduced costs, prevention of fraudulent activity, protection of patient privacy, improved data and systems security. It is thought that this process will ensure that data content is consistent between federal, state, private, and commercial payers and all providers; making electronic data interchange a viable and preferred alternative over current processing methods. The timeline for this process is that the final rules are to be published in a single Implementation Guide that will be disseminated by June 2000 through the end of the year. By the end of 2002, all health care plans, payors and claims processors will need to be in compliance with the standards. The value of this process to RI's efforts cannot be emphasized enough, as this effort will result in more uniform and consistent submission of administrative data by all providers of health care both within RI and throughout the nation.

National Business Coalitions

Although there are a number of business coalitions throughout the nation that have developed public reports, few of them concern hospitals and are based exclusively on administrative data. The Colorado Hospital Association reports annually on hospital-specific measures related to length of stay for high volume conditions. The data included in these reports is audited using a set of HCFA defined edits as well as those developed in-house. The reports are disseminated to the public. The Houston Healthcare Purchasing Organization also reports comparative data, in the form of mortality and complication indexes (i.e., ratio of expected vs. actual numbers) based on HCIA data for the top performing hospitals in Houston and the surrounding counties; the information is available on their Web site (www.hhpo.com). Other coalitions report utilization data (admissions, length of stay, etc.) or financial data for hospitals, and some report data at the health plan level (Qualidigm, 2000).

RAND

Under contract with the HCFA, RAND is conducting analyses at the state level similar to those available in the data compendium published annually by HCFA. The source of these data is HCFA's Medicare and Medicaid Statistical Supplement published in Health Care Financing Review. In addition to the general health measures, RAND will produce additional diagnosis-specific analyses and analyses of data from Medicare+Choice organizations. RAND will also assemble state level data from HCFA's administrative data sources (including Part A and B data as well as Beneficiary Enrollment and related files) on Medicare beneficiary demographics; utilization measures such as discharges, total charges, and length of stay; and outcome measures, such as readmission's and death rates. These descriptive reports will support the PROs in their 6th Scope of Work.

Stanford

Under contract with AHRQ, Stanford's UCSF-Stanford Evidence-based Practice Center is performing a review of literature on new quality measures that might be considered in future iterations of the Healthcare Cost and Utilization Project (HCUP) indicators. The study focuses on hospital administrative data. This development is to occur in the following areas: pediatric care, medical conditions (especially chronic conditions), indicators aligned with the goals of Healthy People 2010, and new procedures and technological innovations. Stanford's initial work focuses on interviewing staff at agencies who have worked with all new indicators since 1995 that are based solely on administrative data sets. Second, the current and proposed HCUP quality indicators with appropriate risk-adjustment will be empirically tested using HCUP data. Third, the current HCUP software originally developed by AHRQ will be updated to incorporate the new indicators of risk-adjustment methods. This work is in its first stages and the first part of the project is due to be completed in November 2000.

State Efforts

Pennsylvania Health Care Cost Containment Council

The Pennsylvania Health Care Cost Containment Council (PHC4) is an independent state agency concerned with health care costs, quality and access for all Pennsylvania (PA) residents. PHC4 recently published a hospital performance report on discharge data from calendar year 1997 (www.phc4.org). All of PA's general and specialty acute care hospitals are included in the report. The data were risk adjusted, using AtlasTM, which relies on abstracted medical record data, not administrative data (Pennsylvania Health Care Cost Containment Council, 1999). The report focused on 15 selected diagnostic related groups (DRGs).

A condition-specific report, "Pennsylvania's Guide to Coronary Artery Bypass Graft Surgery, 1994-1995" was published in May 1998 (Pennsylvania Health Care Cost Containment Council, 1988). The report relied upon the following data sources: administrative data from the Council's Database that includes inpatient and ambulatory surgery data; and data abstracted from the medical record were used to generate a severity score for each patient. The report contains hospital-specific, surgeon-specific and managed care plan-specific results. The quality control

and data verification processes involved in producing the report were intensive to ensure that each individual surgeon's reported rates were accurate. As such, the quality of the data reported sets a national standard for risk adjusted outcomes data.

New York

Beginning in 1992, a broad coalition of providers, payors and governmental agencies met to develop uniform data set specifications based on the UB-92 national guidelines as well as NY State data reporting requirements. The organizations represented included: the Department of Health, Department of Social Services, Department of Insurance, Office of Mental Health, Health Care Financing Administration Intermediary, Hospital Association of New York, the New York City Health and Hospitals Corporation, Empire Blue Cross/ Blue Shield, Group Health Incorporated, and individual hospitals.

(<http://www.health.state.ny.us/nysdoh/sparcs/operations/who.htm>) The result of the coalition's work is that as of April 1994, hospitals in NY are required to submit data in conformance with the Universal Data Set Specification. This ensures a streamlined data collection effort that reduces redundancy. In addition to timing of diagnosis, the database captures admission and discharge hour. The database that contains this information is called SPARCS (Statewide Planning and Research Cooperative System). The SPARCS system is an all payer, statewide discharge data system that collects every inpatient and ambulatory surgery encounter to the State (<http://www.health.state.ny.us/nysdoh/sparcs/sparcs.htm>). New York saw HIPAA as an opportunity to align its state data collection effort with HIPAA standards. The annual reports, that are publicly reported, contain hospital-specific data, but are not risk adjusted (Statewide Planning and Research Cooperative System Annual Report 1998, 1999).

California

In response to a legislative mandate to report risk adjusted outcomes measures on California hospitals, The California Office of Statewide Health Planning and Development (OSHPD) created the California Hospital Outcomes Project (CHOP) (<http://www.oshpd.cahwnet.gov/hpp/chop/index.htm>). The reports CHOP is developing concern the following conditions: Acute Myocardial Infarction, Intensive Care Unit, Hip Fracture, Maternal Outcomes Following Delivery and Pneumonia. To date, AMI data have been published (covering the period 1991-1993) using two administrative databases to compile the AMI data: the CA hospital discharge data set and the CA Vital Statistics data set. Further, preliminary findings on Maternal Outcomes were published. Both publications presented risk-adjusted data by hospital.

A second report, the California CABG Mortality Reporting Project, was produced collaboratively by OSHPD and the Pacific Business Group on Health (PBGH). The source of these data include discharge data, Vital Statistics Data as well as clinical data abstracted by the individual hospitals. Additionally, the United Network for Organ Sharing (UNOS) was the source of data for the transplants measure. The reports present comparative data on: cesarean section deliveries, vaginal birth after cesarean section, newborn re-hospitalization, heart attack mortality, heart surgery mortality, and transplant survival. Data are collected by the OSHPD and analyzed by researchers with the PBGH. The data are risk adjusted and reports are published by hospital on the PBGH web site (<http://www.healthscope.org/>).

Measurement Systems

Core Measures

In response to the need for measuring quality, JCAHO developed the ORYX initiative that requires health care organizations accredited by JCAHO to report data that reflect the quality of care they provide. This is done on a quarterly basis. These data will eventually be incorporated into the JCAHO survey process for accreditation. At this time, the initial ORYX program is being refined to establish several core measures sets that will be standardized across the country. Included in the conditions for which these sets will be developed are three of the four inpatient conditions HCFA has selected to work on (AMI, CHF, and Pneumonia).

HCFA and JCAHO have agreed to align the quality indicators for these conditions between the two organizations as much as possible. HEALTH, HARI, Qualidigm and Rhode Island Quality Partners, Inc., have been working with HCFA and JCAHO toward the same end. This collaboration should result in a set of indicators that may lay the foundation for an initial set of clinical measures that: 1) are required by the HPQMR law 2) meet HCFA's quality improvement requirements in the PRO program and 3) help the hospitals meet their JCAHO/ORYX accreditation requirements.

HCUP 3 (Healthcare Cost and Utilization Project) Quality Indicators

The HCUP initiative was developed by The Agency for Health Research and Quality (AHRQ) in partnership with participating states. HCUP includes two data sources, the Statewide Inpatient Database (SID) and the Nationwide Inpatient Sample (NIS). SID data are available for 13 states for the period 1995 – 1997 and NIS data are available for 1988 through 1997. Twenty-two participating states contribute data on all hospital discharges that are processed into a uniform format that is then returned to the participating statewide data organization. A sample of these data (from about 1,000 hospitals) provides the source for the NIS. Since 1997, hospitals sampled from 22 states are included in NIS. The NIS has a more limited set of data elements than the SID. For example, state-specific information on payer codes is not included.

HCUP 3 was not developed for use as a comparative measurement system across hospitals. Rather, the specifications for the measures were developed to be low-cost and user-friendly for hospital administrators to review performance measures. Also, the information derived from these measures permit multi-state comparisons over time. The HCUP indicators cover three main areas: potentially avoidable adverse hospital outcomes; potentially inappropriate utilization of hospital procedures; and potentially avoidable hospital admissions (see Appendix A for a complete listing of the HCUP 3 quality indicators). The indicators are intended to provide information about outcomes that might have been avoided, over or under utilization of services and access to community based care. Hospital discharge data must contain the following data elements in order to use the HCUP indicators: diagnoses, procedures, age, gender, admission source, discharge status and in some instances, procedure dates.

The measures do not provide a risk adjustment methodology, but there are guidelines for comparing one state's rates to national benchmarks. The measures were developed for the

purpose of highlighting areas that may require more in-depth investigation. This system may be useful for public reporting in the aggregate, but not for reporting at the facility level. In fact, the state of Utah publishes HCUP data at the facility level for a number of measures (http://hlunix.hl.state.ut.us/hda/Reports/QI2_1998.pdf). As previously described, an AHRQ funded study is currently under way at Stanford University to address the development of new quality indicators.

Rhode Island has carefully considered using HCUP measures for performance reporting. In fact, such a preliminary investigation was completed with four years worth of discharge data that was broken down by hospital as well as key demographic indicators. Given that the measures were not developed for reporting at the facility-level, the option of reporting HCUP measures was not pursued.

Rhode Island Use of Administrative Claims Data

As part of the Internal Scan conducted by Qualidigm, a comprehensive assessment of the available administrative data in Rhode Island and how the data are used and might be used is documented. The following section describes how the Hospital Discharge Data have been used in the past to measure quality of care.

Rhode Island's Hospital Discharge Database contains 58 fields, including demographic, clinical and financial elements. Data collection has been mandated since October of 1989 by the hospital licensure regulations. Therefore, any amendments to the discharge data collection specifications must to be made via a change in the regulations.

The Hospital Discharge Database, when linked with other databases available in Rhode Island, has proven useful for reporting on condition specific disease states. For example, HEALTH published "Trends in Asthma Morbidity and Mortality, Rhode Island 1988-1997." This document presented the fluctuation in rates of morbidity and mortality of pediatric asthma in Rhode Island.

Areas for Further Research/Recommendations

The enhancement of hospital discharge data must balance two competing needs. The first is to collect the minimum information necessary for billing/financial purposes while providing the data elements necessary for publicly accountable reporting.

One set of data elements proposed by experts in the field are those that support efforts to risk adjust performance measures. For example, obtaining the following information as part of encounter records would inform any risk adjustment methodology: health risk factors (e.g., smoking, seat belt use), health status (possibly patient self-reported), health-related quality of life, allergies, results of health screening and past medical history. Alternatively, collecting data on the timing of diagnoses would be useful for differentiating between risk factors prior to medical intervention and those that are iatrogenic infections. Adding this to the data collection process has proven to add only a modest additional cost based on the experience in NY and at the Mayo clinic (Mitchell, 1990). Based on this limited evidence, Qualidigm recommends that

HEALTH consider the feasibility and utility of requiring the hospitals to collect an “alpha” qualifier, indicating whether the onset of the diagnosis preceded or followed admission to the hospital. Available data and lessons learned from states implementing this process are now available and can be used to guide this process.

Second, we recommend augmenting the HDD with laboratory and pharmacy data to report on process of care indicators that may be derived from electronic laboratory and pharmacy databases. This is currently being explored as evidenced by the survey of hospitals regarding their laboratory and pharmacy data systems.

Third, by documenting and reducing the variability in ICD-9 coding practices across hospitals, the discharge data would be more uniform, reliable and consistent. In an effort to reduce payment errors, as part of the HCFA’s Payment Error Prevention Program (PEPP), Qualidigm and RIQP will provide hospital staff with education regarding appropriate coding. An outcome of this education may indeed be a reduction in the variability of ICD-9 coding.

Overall, Qualidigm suggests that this report be used as a launching board for discussions with experts in the field of administrative data, risk adjustment and performance measurement reporting. Convening a roundtable discussion with such experts will help guide the process of developing sound and proven methods for augmenting HDD.

References

Elixhauser A, Steiner CA. Hospital Inpatient Statistics, 1996. Healthcare Cost and Utilization Project, HCUP Research Note. Rockville, MD: Agency for Health Care Policy and Research; 1999. AHCPR Pub. No. 99-0034.

HCIASachs Methodology for Normative Comparisons: Expected Complications Rate Index. HCIASachs, 2000.

Iezzoni L, Lawthers AG et al., Screening Quality of Care Using Administrative Data: Final Report. Agency For Health Care Policy and Research RO1HS09099, 5/10/96 – 10/1/98. Beth Isreal Beaconess Medical Center, 1999.

Iezzoni L. Risk Adjustment for Measuring Health Care Outcomes. Health Administrative Press; Chicago, IL. Foundation of the American College of Executives, 1997.

Marciniak TA, Ellerbeck EF, Radford MJ, Kresowik TF, Gold JA, Krumholz HM, Kiefe CI, Allman RM, Vogel RA, and Jencks SF. Improving the Quality of Care for Medicare Patients with Acute Myocardial Infarction: Results From the Cooperative Cardiovascular Project. *JAMA*. 1998; 279(17):1351-1357.

Mitchell et al. Using Medicare Claims for Outcomes Research. *Medical Care*. 1994; 32(7): JS38-JS51.

Naessens JM, Brennan MD, Boberg CJ, Amadio PC, Karver PJ, and Podratz RO. Acquired Conditions: An Improvement to Hospital Discharge Abstracts. *Quality Assurance in Health Care*. 1991; 3(3):257-262.

New York State Department of Health. Statewide Planning and Research Cooperative System Annual Report 1998, Volume 1. 1999.

Pennsylvania Health Care Cost Containment Council. Pennsylvania's Guide to Coronary Artery Bypass Graft Surgery. May 1998.

Pennsylvania Health Care Cost Containment Council. A Hospital Performance Report, 1998-3 Regional Versions (Western PA, Central and Northeastern PA, Eastern PA). 1999.

Pine, M et al., The Usefulness of Enhanced Billing Data and Numerical Laboratory Values in Computing Risk-adjusted Inpatient Mortality Rates. Presented at the National Association of Health Data Organizations, Washington D.C., January 1999.

Pine M, Jones B, and Lou YB. Laboratory Values Improve Predictions of Hospital Mortality. *International Journal for Quality in Health Care*. 1998;10(6):491-501.

Pine M, Norusis M, Jones B, Rosenthal GE. Predictions of Hospital Mortality Rates: A Comparison of Data Sources. *Annals of Internal Medicine*. 1997;126(5):347-54.

Reporting Publicly Accountable Performance Measures of Quality in Health Care: Public Reporting Scan, Draft Report. Qualidigm, January 2000.

Zach, AP, Romano, PS, Luft, HS. Report on Heart Attack, 1991-1993 Volume 1: User's Guide, Sacramento, CA: California Office of Statewide Health Planning and Development, December 1997.

HCUP Quality Indicators

1. Potentially avoidable adverse hospital outcomes (16 indicators)

Inpatient mortality rates

Hysterectomy
Laminectomy/spinal fusion
Cholecystectomy
Transurethral prostatectomy
Hip replacement
Knee replacement
Obstetrical complications
Adverse effects and iatrogenic complications
Wound infection

Complication rates

Pulmonary compromise after major surgery
Acute myocardial infarction after major surgery
Gastrointestinal hemorrhage or ulceration after major surgery
Venous thrombosis or pulmonary embolism after major surgery/invasive vascular procedure
Mechanical complications due to device, implant, or graft (excluding organ transplant)
Urinary tract infection after major surgery
Pneumonia after major surgery/invasive vascular procedure

2. Potentially inappropriate utilization of hospital procedures (9 indicators)

Cesarean section delivery
Successful vaginal birth after cesarean section (VBAC)
Incidental appendectomy among elderly
Hysterectomy
Laminectomy and/or spinal fusion
Transurethral prostatectomy
Radical prostatectomy
Laparoscopic cholecystectomy
Coronary artery bypass graft (CABG)

3. Potentially avoidable hospital admissions (8 indicators)

Low birthweight
Very low birthweight
Pediatric asthma
Immunization-preventable pneumonia and influenza among the elderly
Cerebrovascular disease among nonelderly adults
Diabetes short-term complications
Diabetes long-term complications
Perforated appendix

Internet Citation:

Quality Indicators from the Healthcare Cost and Utilization Project (HCUP QIs). Fact Sheet. Agency for Healthcare Research and Quality, Rockville, MD. <http://www.ahrq.gov/data/qifact.htm>